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# Dell M8428-k

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## Hardware Reference Manual

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Regulatory Model Codes: M8428-k

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## How this document is organized

This document is organized to help you find the information that you want as quickly and easily as possible.

The document contains the following components:

- [Chapter 1, “Introducing the Dell M8428-k,”](#) describes the converged network switch and explains its basic concepts and features. This chapter also provides instructions for unpacking the switch module from its shipping container, and references to the appropriate publication for installing the module into the Blade Server Enclosure.
- [Chapter 2, “Configuring the Dell M8428-k”](#) describes how to change the converged network switch's IP address, connect the module to the Ethernet network and fabric, change between NPIV mode and full fabric mode, and backing up the switch module configuration.
- [Chapter 3, “Operating the Dell M8428-k,”](#) provides details about monitoring and replacing a switch module.
- [Appendix A, “Dell M8428-k specifications,”](#) is a product specification reference.

## Supported hardware and software

This document includes information specific to the Dell M8428-k only.

## What's new in this document

This is a new document.

# Document conventions

This section describes text formatting conventions and important notice formats used in this document.

## Text formatting

The narrative-text formatting conventions that are used are as follows:

<b>bold text</b>	Identifies command names Identifies the names of user-manipulated GUI elements Identifies keywords and operands Identifies text to enter at the GUI or CLI
<i>italic text</i>	Provides emphasis Identifies variables Identifies paths and Internet addresses Identifies document titles
<code>code text</code>	Identifies CLI output Identifies command syntax examples

For readability, command names in the narrative portions of this guide are presented in mixed lettercase: for example, switchShow. In actual examples, command lettercase is all lowercase.

## Command syntax conventions

Command syntax in this manual follows these conventions:

<b>command</b>	Commands are printed in bold.
<b>--option, option</b>	Command options are printed in bold.
<b>-argument, arg</b>	Arguments.
[ ]	Optional element.
<i>variable</i>	Variables are printed in italics. In the help pages, values are <u>underlined</u> or enclosed in angled brackets < >.
...	Repeat the previous element, for example “member[;member...]”
value	Fixed values following arguments are printed in plain font. For example, <b>--show WWN</b>
	Boolean. Elements are exclusive. Example: <b>--show -mode egress   ingress</b>

## Command examples

This book describes how to perform configuration tasks using the switch module command line interface, but does not describe the commands in detail.



## Notes, cautions, and warnings

The following notices and statements are used in this manual. They are listed below in order of increasing severity of potential hazards.

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### NOTE

A note provides a tip, guidance or advice, emphasizes important information, or provides a reference to related information.

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### ATTENTION

An Attention statement indicates potential damage to hardware or data.

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### CAUTION

A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.

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### DANGER

*A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.*

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## Key terms

For definitions of SAN-specific terms, visit the Storage Networking Industry Association online dictionary at:

<http://www.snia.org/education/dictionary>

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These references are made for informational purposes only.

Corporation	Referenced Trademarks and Products
Dell, Inc.	PowerEdge
Microsoft Corporation	Windows, Windows 2000, Windows 2003, Windows XP
Sun Microsystems, Inc.	Solaris
Red Hat Inc.	Red Hat Enterprise Linux (RHEL)
Novell, Inc	SUSE Linux Enterprise Server (SLES)

## Additional information

This section lists additional industry-specific documentation that you might find helpful.

### Industry resources

For additional resource information, visit the Technical Committee T11 Web site. This Web site provides interface standards for high-performance and mass storage applications for Fibre Channel, storage management, and other applications:

<http://www.t11.org>

For information about the Fibre Channel industry, visit the Fibre Channel Industry Association Web site:

<http://www.fibrechannel.org>

## Getting technical help

Contact your switch support supplier for hardware, firmware, and software support, including product repairs and part ordering. To expedite your call, have the following information available:

### 1. General Information

- Switch model
- Switch operating system version
- Software name and software version, if applicable
- Error numbers and messages received
- **supportSave** command output
- Detailed description of the problem, including the switch or fabric behavior immediately following the problem, and specific questions
- Description of any troubleshooting steps already performed and the results
- Serial console and Telnet session logs
- syslog message logs

### 2. Switch Serial Number

The switch serial number and corresponding bar code are provided on the serial number label, as illustrated below.:



### 3. World Wide Name (WWN)

Use the **lenseldShow** command to display the WWN of the chassis.

If you cannot use the **lenseldShow** command because the switch is inoperable, you can get the WWN from the same place as the serial number.





# Introducing the Dell M8428-k

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## Dell M8428-k overview

The Dell M8428-k is a 28-port switch module with 8 external Converged Enhanced Ethernet (CEE) ports, 4 external Fibre Channel (FC) ports, and 16 internal CEE ports that installs in a Dell PowerEdge M1000e Blade Server Enclosure. The switch module is designed to be inserted in any of the bays labeled B1, B2, C1, or C2.

The external CEE ports operate at 10 Gbps. The internal CEE ports can operate at either 10 Gbps or 1 Gbps. The FC ports support link speeds up to 8 Gbps.

The 16 internal ports connect to the server utilizing 10GBase-KR (KR) technology.

The Dell M8428-k ships with N\_Port ID Virtualization (NPIV) mode enabled. This technology provides the ability to attach more devices to the fabric without having to create more domains.

Management for the converged network switch can be done through Dell Chassis Management Controller (CMC), the browser based GUI, or the command line interface (CLI).

The switch module contains three (3) temperature sensors. While the sensors will report the temperature of the switch, they will not initiate shutdown if the temperature is too high. That decision is made by the CMC.

The switch ships with three licenses installed:

- Fabric license
- Enhanced Group Management license
- FCoE Base license

## NPIV mode and full fabric mode

The converged network switch can function in either NPIV mode or full fabric mode.

- The switch module is shipped in NPIV mode by default.

# 1 NPIV mode and full fabric mode

- NPIV mode simplifies SAN deployment by using N\_Port ID Virtualization. NPIV provides Fibre Channel switch functions that improve switch module scalability, manageability, and interoperability.
  - For a list of switch module F\_Ports mapped to N\_Ports in the switch module as shipped from the factory, refer to [“NPIV Mode default port mapping”](#) on page 27.

---

**NOTE**

NPIV mode-enabled switches cannot be connected directly into an array; it requires a fabric to support NPIV.

---

Features available on the switch module depend on whether the module is configured in NPIV or full fabric mode.

[Table 1](#) lists Fabric OS components that are supported on a switch when NPIV mode is enabled. “No” indicates that the feature is not provided in NPIV mode. “NA” indicates this feature is not applicable in NPIV mode of operation. A single asterisk (\*) indicates the feature is transparent to NPIV, that is NPIV forwards the request to the Enterprise fabric. Two asterisks (\*\*) indicates that if the Enterprise fabric is not of a specific configuration, the feature may not be available.

**TABLE 1** Fabric OS components supported in NPIV mode

Feature	Support
Access Control	Yes (limited roles) <sup>1</sup>
Admin Domains	No
Audit	Yes
Beaconing	Yes
Config Download/Upload	Yes
DHCP	Yes
Environmental Monitor	Yes
Error Event Management	Yes
Extended Fabrics	No
Fabric Device Management Interface (FDMI)	Yes*
Fabric Watch	Yes (limited)
FICON (includes CUP)	No
Native Interoperability Mode	NA
License	Yes**
Log Tracking	Yes
Management Server	NA
Manufacturing Diagnostics	Yes
N_Port ID Virtualization	Yes
Name Server	NA
Network Time Protocol (NTP)	No (no relevance from fabric perspective) <sup>2</sup>
Open E_Port	NA
Performance Monitor	Yes (Basic PM only, no APM support)
Port Mirroring	No

**TABLE 1** Fabric OS components supported in NPIV mode (Continued)

Feature	Support
QuickLoop, QuickLoop Fabric Assist	No
Security	Yes (ADS/DCC Policy)
SNMP	Yes
Speed Negotiation	Yes
Syslog Daemon	Yes
Trunking	Yes**
Zoning	NA

1. When a switch is enabled in NPIV mode, RBAC features in the Fabric OS are available, but there are some limitations.

2. In embedded switches, time should be updated by the server management utility.

## NPIV mode hardware considerations

Hardware considerations for NPIV mode are as follows:

- Loop devices are not supported.
- Direct connections to SAN target devices are only supported if the NPIV-enabled module is connected to a fabric.

## Hardware description

This section describes the physical switch module as shipped from the factory. For specifications, such as installed memory, weight and physical dimensions, facility requirements, architectural specifications, and regulatory compliance, refer to [Appendix A, “Dell M8428-k specifications”](#)

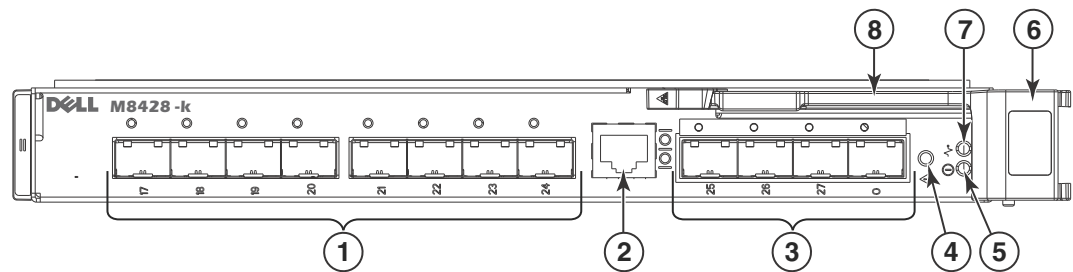
### Port side

Externally accessible ports and LEDs are on the port side of the switch module. The port side faces out when the switch module is inserted into the I/O bay of the Blade Server enclosure. [Figure 1](#) details the port side. For a complete description of the locations and interpretations of these LEDs, see [“Interpreting LED activity”](#) on page 23.

Access the converged network switch handle at the front of the port side of the switch module. By lifting the handle’s release latch, you can open the handle to remove and insert the unit. To extend the release lever, gently squeeze the release latch and pull outward.

# 1 Hardware description

**FIGURE 1** Port side view



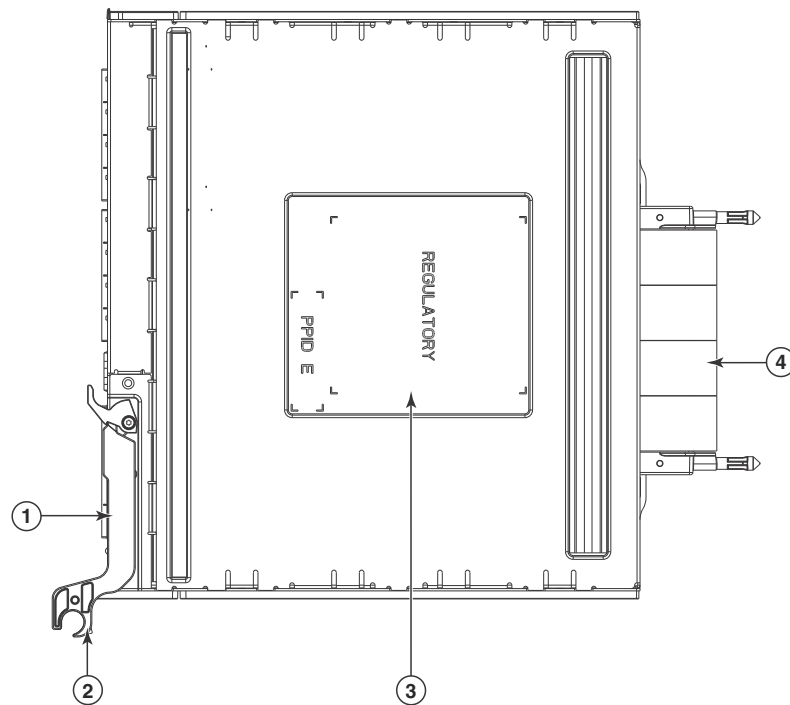
- |   |   |   |                                 |
|---|---|---|---------------------------------|
| 1 | 10 GbE CEE ports with bi-color (green/amber) port status LEDs above each port | 2 | RJ45 console port               |
| 3 | 8 Gbps FC ports with bi-color (green/amber) port status LEDs above each port  | 4 | Switch status LED (green/amber) |
| 5 | Power status LED (green)  | 6 | Release latch                   |
| 7 | Server management LED (blue/amber)  | 8 | Release lever                   |

## Top view

The nonport side of the switch module (shown in [Figure 2](#)) is seated into the enclosure. You do not need to line up the switch module as it will seat correctly when the release lever is closed.

When the switch module is inserted, the midplane connectors activate a connection port, allowing the switch module to be configured in the Blade Server Enclosure.



**FIGURE 2** Top view

- 1 Switch module release lever
- 2 Release latch
- 3 Product label including serial number
- 4 Midplane connectors

## Labeling

Figure 2 shows the labels appearing on the switch module. A second serial label is located beneath the release lever on the enclosure (visible only when the lever is extended).

## Transceivers

### NOTE

You must install Dell-approved transceivers in the switch module.

The converged network switch was designed to work with small form-factor pluggable (SFP) optical modules. The basic switch module ships with four 8 Gbps Dell-approved transceivers for the Fibre Channel ports.

### NOTE

You can also install 4 Gbps transceivers in the FC ports of the switch module. All transceivers must be Dell-approved.

# 1 ISL trunking groups

Transceivers provide optical connections to external devices for both SWL and LWL connections. Replace transceivers with a new pluggable unit rather than replacing the switch module. Refer to the manufacturer's instructions when installing transceivers.

[“Removing and replacing the converged network switch”](#) on page 25 provides details about removing transceivers from the converged network switch.

## ISL trunking groups

If you have purchased an ISL Trunking license for your converged network switch, external FC ports can form trunking groups of ISLs between adjacent switches. Ports that can be used within the same trunking group are color-coded on the switch module's port side for easy identification.

All four external FC ports (0, 25-27) can be formed into a single 4-port trunk if the attached switch supports an 4-port trunk. The ports can also form 2-port or 3-port trunk as well.

---

**NOTE**

Only the external ports are available for trunking.

---

## Optional features

The converged network switch supports the following optional software, which is activated with the purchase of the corresponding license key. Applicable options depend on whether the switch module operates in NPIV or full fabric mode.

### *NPIV mode*

- Fabric/Switch License
- NPIV (N\_Port) Trunking
- Server Application Optimization

### *Full fabric mode*

- Enhanced Group Management<sup>1</sup>
- ISL Trunking
- Advanced Performance Monitoring
- Fabric Watch

1. included with the converged network switch

## Unpacking and installing the Dell M8428-k

If the converged network switch is installed in the Blade Server Enclosure as shipped to you, skip this section. This section applies when installing a new module in an empty bay or replacing an existing converged network switch.

---

**NOTE**

The converged network switch is designed to work in I/O bays B1/B2 and C1/C2 of the Dell M1000e Blade Server Enclosure for SAN connectivity. Make sure to comply with installation requirements in the Blade Server Enclosure *Hardware Owner's Manual*.

---

Perform the following steps to remove the switch module from its shipping package.

1. Open the shipping box and inspect the contents, making sure that nothing is missing or damaged.

Do not insert a damaged converged network switch into the Blade Blade Server Enclosure. If the converged network switch appears to be damaged, contact your sales representative before proceeding.

2. Remove the cardboard accessory tray from on top of the converged network switch.

This tray contains the documentation, regulatory statements, product information guide, and Documentation CD.

3. Remove the switch module from the box.

The protective foam ends will slide out with the switch module.

4. Remove the foam ends from the switch module.

5. Be sure that you have taken the necessary precautions for electrostatic sensitivity; then break the seal warning.

6. Slide the switch module out of the antistatic sleeve and inspect it carefully for any obvious defects or shipping damage.

7. For complete instructions to install the converged network switch into the Blade Server Enclosure, refer to the section on installing a switch module in the Blade Server Enclosure *Hardware Owner's Manual*.

---

**NOTE**

Be sure to remove the protective covers from the midplane connectors before installing the module into the enclosure.

---

# 1 Unpacking and installing the Dell M8428-k

# Configuring the Dell M8428-k

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## Introduction

Use procedures in this chapter to configure the switch module to operate on a network and fabric. Also use steps to change the module's operating mode (full fabric and NPIV modes) using either the browser-based GUI or the command line interface.

---

### NOTE

Although the switch module is configured at the factory for NPIV mode, you can enable it for full fabric mode. For more information, refer to [“Changing from NPIV aggregator mode to full fabric mode”](#) on page 17.

---

This chapter provides configuration procedures that use switch module command line interface (CLI) and the browser-based GUI application. For details refer to the *Dell Converged Enhanced Ethernet Administrator's Guide*, and *Dell Converged Enhanced Ethernet Command Reference*. If the same operation can be performed using the Blade Server Enclosure's Chassis Management Controller (CMC) application, use that application instead.

## Items required

The following items are required for configuring and connecting the converged network switch for use in a network and fabric:

- The converged network switch installed in a Blade Server Enclosure. For instructions, refer to the steps on installing an I/O module in the *Hardware Owner's Manual* for the Blade Server Enclosure.

## 2 Modifying the converged network switch IP address

- If required, management workstation (computer) that has a terminal emulator (such as HyperTerminal) or a keyboard, video, and mouse (KVM) device. Note that this is only required if not changing the converged network switch IP address through the Blade Server Enclosure GUI or CLI management programs.
- An unused IP address and corresponding subnet mask and gateway address unless DHCP is used.
- If required, a serial cable to connect to the switch module serial console port. Note that this is only required if not changing the switch module IP address through the Blade Server Enclosure GUI or CLI management programs.
- Transceivers and compatible fibre cables, as required. The switch module can also use twin-ax copper cables.

---

**NOTE**

Use only Dell-approved transceivers on the external ports of this module.

---

- Access to an FTP server for backing up the converged network switch configuration.
- Access to these publications:
  - Blade Server Enclosure *Hardware Owner's Manual*
  - Blade Server Enclosure *Configuration Guide*
  - *Dell Converged Enhanced Ethernet Administrator's Guide*
  - *Dell Converged Enhanced Ethernet Command Reference*
  - *Dell Fabric OS MIB Reference Manual*

## Modifying the converged network switch IP address

By default, the IP address for the converged network switch is configured as 10.77.77.77 with a default Ethernet subnetmask of 255.255.255.0. The default gateway is 0.0.0.0.

You can set the IP address using three methods. If the IP values are set using any of these methods, the IP values are stored on the switch module.

- Blade Server Enclosure CMC CLI.
- Blade Server Enclosure CMC graphical user interface (GUI).
- Dell M8428-k command line interface (CLI).

After modifying the switch module's IP address and domain name (if switch module is in full fabric mode), we recommend that you cable all external ports to fabric connections before bringing the switch module online.

---

**ATTENTION**

Do not connect the switch module to the internal network until the IP address is correctly set for your Ethernet network requirements.

---

---

**NOTE**

It is recommended that you set the IP address using the Blade Server Enclosure CMC GUI application because this enables centralized management of the converged network switch.

---

## Using the CMC CLI to set the IP address

Use the following steps to connect modify the converged network switch IP address through the CMC CLI.

1. Establish a Telnet session to the CMC CLI.
2. At the command prompt, type **connect switch-x** where x is the bay where the switch module is installed. For example, **switch-x** can be:
  - **Switch-3** for switch module installed in bay B1.
  - **Switch-4** for switch module installed in bay B2.
  - **Switch-5** for switch module installed in bay C1.
  - **Switch-6** for switch module installed in bay C2.
3. At the login prompt, enter the default user name as “admin” and password as “password”.
4. Use the appropriate CLI commands to change the IP address of the selected switch module. Refer to your Blade Server Enclosure CLI documentation.

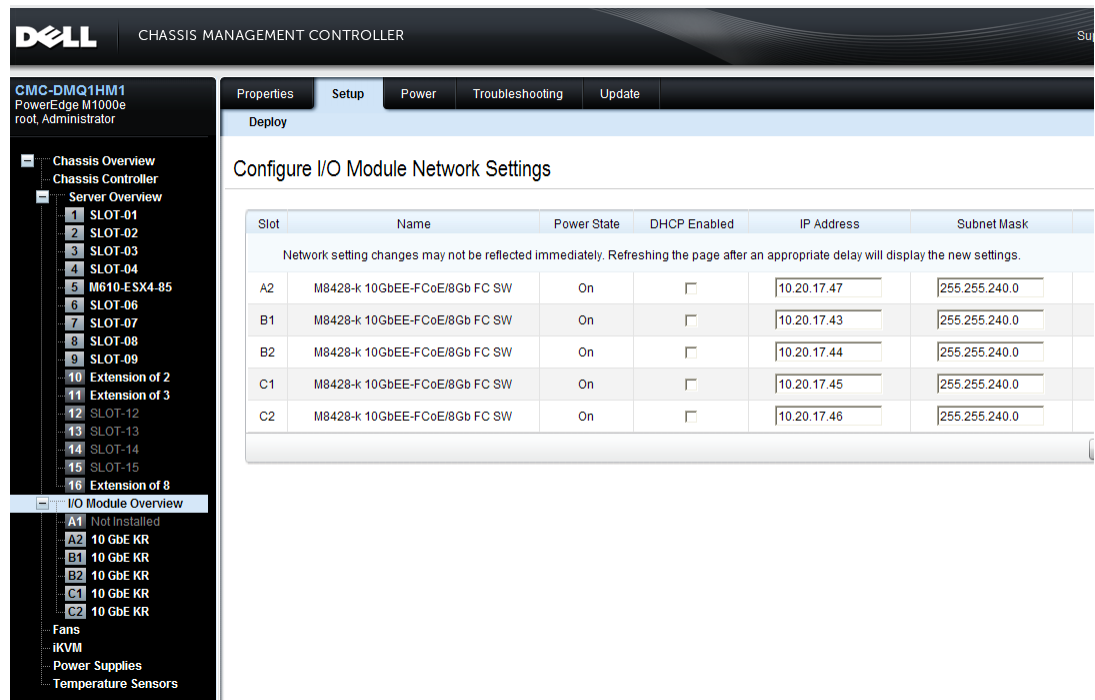
## Using the CMC GUI to set the IP address

To change the IP address, use the following steps:

1. Click the **I/O Module Overview** in the navigation panel of the CMC menu.
2. Open the CMC application's **Setup** tab.
3. Enter the new information in the **IP Address**, **Subnet Mask**, and **Gateway** fields as appropriate and click **Apply**.
4. To enable DHCP, select **DHCP Enabled** and click **Apply**.

**FIGURE 3** CMC Setup Tab

## 2 Modifying the converged network switch IP address



### NOTE

Refer to the documentation for the CMC GUI application for additional detail.

## Using the Dell M8428-k CLI to set the IP address

Use the following tasks to change the IP address on the switch module using the module's CLI. Follow the first few steps to establish a terminal emulation session between the switch module and a Blade Server Enclosure management workstation used for managing the switch module. Once this session is established, you can log into the module and use its CLI commands to manage the module.

1. Connect a serial cable between the serial console port on the converged network switch and a Blade Server Enclosure management workstation that can establish a terminal emulation session with the switch module. For instructions, refer to the *Configuration Guide* for your Blade Server Enclosure.
2. Disable any serial communication programs that are running on the workstation.
3. Using a terminal emulator application (such as HyperTerminal on a PC or TERM in a LINUX or UNIX environment), establish a terminal session to the converged network switch from the management workstation. You will use this connection if you want to reset the module's IP address using CLI commands and perform other configuration tasks.

For Windows 95, 98, 2000, XP, NT, 2003, or 2008

- a. Click **Start** and select **Programs -> Accessories -> Communications**.
- b. Select **HyperTerminal** and enter a name for the connection.
- c. From the Hyper terminal window, click the **Connect** drop-down menu and select an available COM port.



- d. Click **OK**.
- e. From the **COM Port Properties** window, select the following configuration values:
  - Bits per second: 9600
  - Databits: 8
  - Parity: None
  - Stop bits: 1
  - Flow Control: None

For LINUX or UNIX

- a. Enter the following at the command prompt:
 

```
tip /dev/ttyb -9600
```
- b. When the terminal application stops reporting information, press **Enter** to display the login prompt.
- c. Log in to the default administrative account using the following identification:
 

```
Login: admin
Password: password
```
- d. When prompted either change the administrative password, or press **Ctrl-C** to bypass.

4. Verify that the switch module has completed POST. When POST is complete, the port status and switch module power and status LEDs return to a standard healthy state.
5. Enter the CLI **ipAddrSet** command.

Follow on-screen instructions and supply the correct information, as shown in the following example.

```
switch:admin> ipaddrset
Ethernet IP Address [10.77.77.77]:10.32.53.47
Ethernet Subnetmask [255.255.255.0]:255.255.240.0
Fibre Channel IP Addresss [none]:
Fibre Channel Subnetmask [none]:
Gateway IP Address [0.0.0.0]:10.32.48.1
DHCP [Off]:
IP address is being changed...Done.
```

6. Enter **ipAddrShow** at the prompt to verify that the address was correctly set.

## Configuring for FCoE

The initial configuration of the switch has the CEE ports shut down. In order to configure the ports for FCoE operation, you must access the CEE command shell and configure both the internal and external CEE ports. Once you have logged into the switch, use the **cmsh** command to access the CEE command shell. Use the following steps to configure the CEE ports.

1. Login to the switch.
2. Enter the following command:
 

```
cmsh
```
3. Once in the command shell, enter the following command:
 

```
enable
```

## 2 Connecting the switch to the Ethernet management network

4. Enter the following command:

```
conf t
```

5. Enter one of the following commands:

- a. **interface intengigabitethernet 0/x** where x is the internal port you wish to change
- b. **interface extengigabitethernet 0/x** where x is the external port you wish to change

6. The default for internal ports is no shut (enabled) while the default value for external ports is shut (disabled). To enable the external ports, in the port interface enter the following commands:

```
fcoeport  
no shut  
exit
```

7. Repeat steps 5-6 for any other module port you wish to configure.
8. Once finished with all of the module ports, type **exit** and press Enter (you should still be in the CMSH at this point).
9. Enter the following command:

```
write mem
```

Answer **yes** to overwrite the startup file.

10. Enter the following command:

```
copy running-config startup-config
```

Answer **yes** to overwrite.

See the *Dell Converged Enhanced Ethernet Administrator's Guide* for information about CEE CLI interface and configuring switches for FCoE operation and the *Dell Converged Enhanced Ethernet Command Reference* for more details on the commands.

## Connecting the switch to the Ethernet management network

Once you have successfully set the appropriate IP address of the converged network switch, you can establish an Ethernet connection through the Chassis Management Controller (CMC) to a remote management workstation for any additional configuration. The management workstation must be on the same Ethernet subnet as the CMC.

---

### NOTE

Ensure that the switch module is not being modified from any other connection until configuration is complete.

---

## Connecting the switch to the fabric

Before beginning the following steps, determine whether the switch module is in NPIV or full fabric mode. This affects the configuration process. Using the switch module CLI, enter the **ag --modeShow** command to determine the current operating mode.

1. If the switch module is in full fabric mode, continue with [step 2](#) and [step 3](#). If the module is in NPIV mode, go on to [step 4](#).
2. Log onto the converged network switch through a Telnet connection, using the admin account.
3. Modify the domain ID if required using switch module CLI commands.

The default domain ID is 1. If the switch module is not powered on until after it is connected to the fabric and the default domain ID is already in use, the domain ID for the new switch module is automatically reset to a unique value. If the switch module is connected to the fabric after it has been powered on and the default domain ID is already in use, the fabric segments.

To find the domain IDs that are currently in use, run the **fabricShow** command on another converged network switch or switch in the fabric. Identify an unused domain ID.

- a. Disable the converged network switch being configured using the **switchDisable** command.
- b. Enter the **configure** command at the root prompt.

The command prompts display sequentially. Enter a new value at the Domain prompt or press **Enter** to accept the default value. The converged network switch now has a unique domain ID and can join the fabric. Following is an example of command output.

```
Fabric parameters (yes, y, no, n): [no] y

Domain: (1..239) [2]
R_A_TOV: (4000..120000) [10000]
E_D_TOV: (1000..5000) [2000]
WAN_TOV: (0..30000) [0]
MAX_HOPS: (7..19) [7]
Data field size: (256..2112) [2112]
Sequence Level Switching: (0..1) [0]
Disable Device Probing: (0..1) [0]
Suppress Class F Traffic: (0..1) [0]
Per-frame Route Priority: (0..1) [0]
Long Distance Fabric: (0..1) [0]
BB credit: (1..27) [16]
Disable FID Check (yes, y, no, n): [no]
Insistent Domain ID Mode (yes, y, no, n): [no]
Configure edge hold time (yes, y, no, n): [no]
Virtual Channel parameters (yes, y, no, n): [no]
F-Port login parameters (yes, y, no, n): [no]
Zoning Operation parameters (yes, y, no, n): [no]
RSCN Transmission Mode (yes, y, no, n): [no]
Arbitrated Loop parameters (yes, y, no, n): [no]
System services (yes, y, no, n): [no]
Portlog events enable (yes, y, no, n): [no]
ssl attributes (yes, y, no, n): [no]
rpcd attributes (yes, y, no, n): [no]
cfgload attributes (yes, y, no, n): [no]
webtools attributes (yes, y, no, n): [no]
Custom attributes (yes, y, no, n): [no]
system attributes (yes, y, no, n): [no]
System (yes, y, no, n): [no]
```

WARNING: The domain ID will be changed. The port level zoning may be affected

- c. Re-enable the switch module by entering the **switchEnable** command.

## 2 Connecting the switch to the fabric

---

**NOTE**

It could take a short time (typically a few seconds, but sometimes up to 20 seconds) for the newly added switch module to appear in the fabric display with its newly assigned domain ID.

---

4. If you need to install transceivers, install them in the external CEE and FC ports as required.
  - a. Remove the dust plugs from the ports to be used.
  - b. If necessary, remove the end caps from the transceiver.
  - c. Orient the transceiver correctly and insert it into a port until it is firmly seated and the latching mechanism clicks.

For instructions specific to the type of transceiver, refer to the transceiver manufacturer's documentation.
  - d. Repeat substeps a, b, and c for the remaining ports, as required.

---

**NOTE**

Use only Dell-approved transceivers in the external optical ports of this module.

---

5. Connect the cables to the transceivers.

The transceivers are keyed to ensure correct orientation. If a transceiver does not install easily, ensure that it is correctly oriented and that the end caps have been removed. The cables used in trunking groups must meet specific requirements.

---

**ATTENTION**

A cable should not be bent to a radius less than 5.08 cm (2 inches) under full tensile load and 3.048 cm (1.2 inches) with no tensile load.

---

Tie wraps are not recommended for optical cables because they are easily overtightened.

- a. Orient a cable connector so that the key (the ridge on one side of connector) aligns with the slot in the transceiver.
  - b. Insert the cable into the transceiver until the latching mechanism clicks. For instructions specific to cable type, refer to the cable manufacturer's documentation.
  - c. Repeat for the remaining transceivers as required.
6. Check the LEDs to verify that all components are functional.

For information about LED patterns, see the ["Interpreting LED activity"](#) on page 23.
7. Verify the correct operation of the converged network switch by typing the **switchShow** command from the workstation.

This command provides information about switch module and port status.
8. Verify the correct operation of the converged network switch in the fabric by entering one of the following commands:
  - a. If you are in NPIV mode, enter the **ag -show** command
  - b. If you are in full fabric mode, enter the **fabricShow** command
9. Back up the switch module configuration to an FTP server. See ["Backing up the configuration"](#) on page 20 for specifics.

These commands upload the converged network switch configuration to the server, making it available for downloading to a replacement converged network switch if necessary. Dell recommends backing up the configuration on a regular basis to ensure that a complete configuration is available for downloading to a replacement switch module.

## Changing from NPIV aggregator mode to full fabric mode

If your converged network switch is currently configured in NPIV mode, you can enable the module for full fabric mode by disabling NPIV mode. When you do this, the module automatically reboots in full fabric mode.

Determine if the switch module is running in NPIV mode by entering the **switchShow** CLI command to display the current switch configuration. If running in NPIV aggregator mode, the switchMode parameter will display **Access Gateway**.

---

### NOTE

Disabling NPIV mode is disruptive because the switch is disabled and rebooted. Always back up the current configuration before enabling or disabling NPIV mode. Enabling NPIV mode clears the security and zone databases. Disabling NPIV mode clears the F\_Port to N\_Port mapping.

---

## Changing to full fabric mode using the browser-based GUI

Complete the following steps to enable full fabric mode using the browser-based GUI.

1. From the management console, open a Web browser.
2. Enter the IP address of the converged network switch into the Address field of the Web browser.
3. Log into the browser-based GUI using the default administrative account.

```
Login: admin
Password: password
```

4. From the Fabric Tree, select the converged network switch.  
The selected switch module appears in the Switch View.
5. Click the **Switch Admin** button in the browser-based GUI **Manage** task box.  
The Switch Administration window opens.

---

### NOTE

You should save the configuration file if you are converting an converged network switch to NPIV mode. To save your current configuration, click the **Show Advanced Mode** button in the top right-hand corner of the Switch Administration window. Select the **Configure** tab, then select the **Upload/Download** tab. Enter the relevant information to upload the configuration file.

---

6. From the Switch Status section, click **Disable**.
7. From the NPIV Mode section, click **Disable**.
8. Click **Apply**.
9. When prompted, click **Yes** to restart the switch module in full fabric mode.

## 2 Changing from full fabric mode to NPIV aggregator mode

The current browser-based GUI session closes; relaunch browser-based GUI after the switch module reboots.

### Changing to full fabric mode using the command line interface

Complete the following steps to enable NPIV mode using the CLI.

1. Log in using the default administrative account.

```
Login: admin
Password: password
```

2. Enter the following command to disable the switch.

```
switchDisable
```

3. Back up the switch configurations. See [“Backing up the configuration”](#) on page 20 for specifics.

4. Enter the following command to enable full fabric mode:

```
ag --modeDisable
```

The switch module automatically reboots and comes back online in full fabric mode. The NPIV parameters, such as port mapping and failover and failback, are automatically removed.

You can enter the **ag --modeShow** command to ensure that the module is in NPIV mode.

```
ag --modeShow
```

The response should say:

```
Access Gateway mode is NOT enabled.
```

## Changing from full fabric mode to NPIV aggregator mode

If your converged network switch is currently configured in full fabric mode you can enable NPIV mode using the following instructions. You can log into the switch module and enable NPIV mode using either the browser-based GUI or the switch module command line interface (CLI).

Determine if the converged network switch is running in full fabric mode by entering the **switchShow** CLI command to display the current switch configuration. If running in full fabric mode, the switchMode parameter should display **Native**.

---

#### NOTE

Enabling NPIV mode is a disruptive process because the switch is disabled and rebooted. Always back up the current configuration before enabling or disabling NPIV mode. Enabling NPIV mode clears the security and zone databases. Disabling NPIV mode clears the F\_Port to N\_Port mapping.

---

Once you enable the converged network switch in NPIV mode, only a limited subset of the fabric operating system commands are available and all fabric-related service requests are forwarded to the fabric switches.

## Changing to NPIV mode using the browser-based GUI

Complete the following steps to enable NPIV mode using the browser-based GUI.

1. From the management console, open a Web browser.
2. Enter the IP address of the converged network switch into the Address field of the Web browser.
3. Log into the browser-based GUI using the default administrative account.

```
Login: admin
Password: password
```

4. From the Fabric Tree, select the converged network switch.  
The selected switch module appears in the Switch View.
5. Click the **Switch Admin** button in the browser-based GUI **Manage** task box.  
The Switch Administration window opens.

---

### NOTE

You should save the configuration file if you are converting an converged network switch to NPIV mode. To save your current configuration, click the **Show Advanced Mode** button in the top right-hand corner of the Switch Administration window. Select the **Configure** tab, then select the **Upload/Download** tab. Enter the relevant information to upload the configuration file.

---

6. From the Switch Status section, click **Disable**.
7. From the NPIV Mode section, click **Enable**.
8. Click **Apply**.
9. When prompted, click **Yes** to restart the switch module in NPIV mode.  
The current browser-based GUI session closes; relaunch browser-based GUI after the switch module reboots.

## Changing to NPIV mode using the command line interface

Complete the following steps to enable NPIV mode using the CLI.

1. Log in using the default administrative account.

```
Login: admin
Password: password
```

2. Enter the following command to disable full fabric mode.

```
switchDisable
```

3. Back up the switch configurations. See [“Backing up the configuration”](#) on page 20 for specifics.
4. Enter the following command to enable NPIV mode:

```
ag --modeEnable
```

The switch module automatically reboots and comes back online in NPIV mode using a factory default F\_Port to N\_Port mapping.

## 2 Backing up the configuration

5. You can enter the **ag --modeShow** command to ensure that the module is in NPIV mode.

```
ag --modeShow
```

The response should be:

```
Access Gateway mode is enabled.
```

You can also enter the **ag --mapshow** command to display the F\_Port to N\_Port mapping. Enter **ag --help** command to display a list of all NPIV actions.

## Backing up the configuration

Perform these steps to back up the switch module configuration to an FTP server.

1. Open a Telnet or SSH session to the switch module.
2. Enter the following command to upload the basic configuration of the switch module:

```
configUpload
```

You are then presented with a series of prompts.

3. Follow the prompts to upload the configuration.
4. When the upload completes, enter the following command to access the CEE CLI:

```
cmsh
```

5. Enter the following command to upload the current CEE configuration:

```
copy running-config ftp://[username@server/path]
```

You are then prompted for a password.

When you enter the password, the copy procedure begins.

These commands upload the switch module configurations to the server, making it available for downloading to a replacement switch module if necessary.

Dell recommends backing up the configuration on a regular basis to ensure that a complete configuration is available for downloading to a replacement switch module.



# Operating the Dell M8428-k

---

## In this chapter

- [Interoperability](#) . . . . . 21
- [Accessing the converged network switch](#) . . . . . 22
- [Interpreting POST results](#) . . . . . 22
- [Interpreting LED activity](#) . . . . . 23
- [Locating the serial number](#) . . . . . 24
- [Removing and replacing the converged network switch](#) . . . . . 25

## Interoperability

The converged network switch supports interoperability for the following functions:

- link initialization
- principal converged network switch selection
- routing (FSPF)
- Simple Name Service
- state change notification
- soft WWN zoning
- SNMP facilities
- translatable mode (private target support on fabrics)
- trunking (between two Dell switches)
- Advanced Performance Monitoring

## Port negotiation on Fibre Channel ports

The converged network switch has been designed to be highly interoperable. 8 Gbps ports support 2, 4, and 8 Gbps transmit and receive rates with autonegotiation using SFP+ transceivers. You can also install 4 Gbps SFP transceivers, which allow 1 Gbps, 2 Gbps, and 4 Gbps transmit and receive rates with autonegotiation. The actual data signaling rate used on a port is automatically sensed and set to the rate supported by the device or devices attached to the port.

---

### NOTE

You must install Dell-approved transceivers in the switch module.

---

If the converged network switch is connected to a device, but is unable to negotiate the signaling rate, the operator can manually set the speed of each port through the management interfaces.

The converged network switch is compliant with current Fibre Channel standards, including most current-generation switch N\_Ports, NL\_Ports, and E\_Ports as well as host adapters, Redundant Array of Independent Disks (RAID) storage devices, hubs, Fibre-SCSI bridge devices, and older switch families.

## Accessing the converged network switch

The converged network switch is managed as a single element. It has a single IP address and appears as a separate entity to the Telnet protocol and the Simple Network Management Protocol (SNMP).

When SNMP devices send SNMP messages to a management console running SAN management software, the information is stored in a Management Information Base (MIB). The switch module OS supports the FibreAlliance Fibre Channel Management (FCMGMT) MIBs, allowing the provision of needed information to a SAN administrator.

Secure Telnet access is available using Secure Shell (SSH), a network security protocol for secure remote login and other secure network services over an insecure network.

Browser-based GUI management is available through a secure browser using Secure Sockets Layer (SSL). The SSL security protocol provides data encryption, server authentication, message integrity, and optional client authentication for a TCP/IP connection. Because SSL is built into all major browsers and Web servers, installing a digital certificate enables the SSL capabilities.

## Interpreting POST results

The power-on self test (POST) system check is performed each time the converged network switch is powered on, rebooted, or reset.

### Example POST Output

```
POST1: Started running Fri Oct 8 13:39:25 GMT 2010
POST1: Test #1 - Running ceeturboramtest
POST1: Running diagshow
POST1: Script PASSED with exit status of 0 Fri Oct 8 13:39:54 GMT 2010 took
(0:0:29)
POST2: Started running Fri Oct 8 13:39:54 GMT 2010
POST2: Test #1 - Running ceeportloopbacktest (SERDES)
POST2: Test #1 - Running ceeportloopbacktest (BACKPLANE)
```

During POST, the LEDs are activated in various indicator patterns.

Perform the following steps to determine POST completion status.

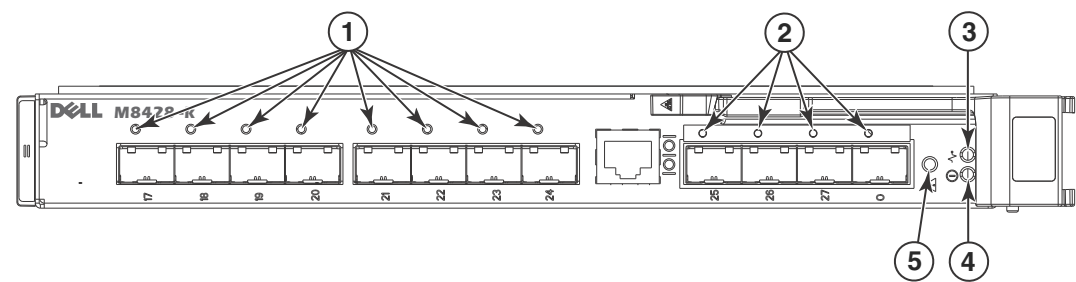
1. Verify that the LEDs on the converged network switch indicate a healthy converged network switch. LED patterns are described in [“Interpreting LED activity,”](#) next.  
  
If one or more LEDs do not display a healthy state, verify that the LEDs are not set to beacon. Use the switch module CLI **switchShow** command or the browser-based GUI to verify the LED state.
2. Use the Blade Server Enclosure’s Chassis Management Controller (CMC) GUI to verify that the converged network switch is working correctly.  
  
For details, refer to the *Hardware Owner’s Manual* for the Blade Server Enclosure.
3. Review the system log for errors.

Any errors detected during POST are written to the system log. Access this log through the Module’s CLI **errShow** command.

# Interpreting LED activity

Each converged network switch uses LEDs to indicate status. These LEDs are shown in [Figure 4](#).

**FIGURE 4** LED Locations



- |   |  |   |   |
|---|--|---|---|
| 1 | Bi-color (green/amber) LEDs for 10 GbE CEE ports | 2 | Bi-color (green/amber) LEDs for 8 Gbps FC ports |
| 3 | Server management LED (blue/amber)               | 4 | Power status LED (green)                        |
| 5 | Switch status LED (green/amber)                  |   |   |

The front panel of the switch module has two sets of LEDs. The power and status/fault LEDs on the right of the switch module indicate the switch module status. The fault/activity LEDs on the CEE ports and the fault/activity LEDs on the FC ports indicate the status of the external ports. Each port has one bi-color LED.

See [Figure 4](#) on page 23 for the locations of the LEDs on the switch module. These LEDs are described in “[Switch module status LEDs](#)” on page 23 and “[Port status LEDs](#)” on page 24.

Any errors that are detected during POST are written to the system log.

When POST errors are written to the system log, these errors are also written to the BladeCenter management module event log. If a hardware error, such as a current fault occurs, the management module displays it. If a software error occurs, the management module displays the “Module did not complete POST” message and a post error code that indicates the test that was running when the error was detected.

---

**NOTE**

You can also use the management module to make sure that the switch module is operating correctly. For more information, see the documentation for the BladeCenter unit.

---

## Switch module status LEDs

The following table provides descriptions of the switch module status LEDs on the front panel of the switch module.

### 3 Locating the serial number

**TABLE 2** System Status LEDs

Location	Indicator	Color	Description
	Power	Green	Off - no power On - power is on
	Status	Green/Amber	Off - Switch is off Green - OK Amber - boot-up state or one or more ports are offline or reset state Blinking (green/amber alternating) - error
	CMC Management	Blue/Amber	Steady blue - Normal/Stack Master Flashing blue - Module identify Steady amber - Not used Flashing amber - Fault Off - on fault/Stack Slave

### Port status LEDs

The following table provides descriptions of the port status LEDs on the front panel of the switch module.

**TABLE 3** CEE and FC port status LEDs

Location	Port type	Color	Description
	CEE ports	Bi-color LED green/amber	Off - no link or unlicensed Steady green - link is present Flashing green - activity over the link Steady amber - fault
	FC ports	Bi-color LED green/amber	Off - no link Steady green - link is present Flickering green - normal activity Slowly flashing green - segmented Rapidly flashing green - loopback Steady amber - no sync Slowly flashing amber - disabled Rapidly flashing amber - fault

## Locating the serial number

Before contacting service support, be sure to obtain the module's serial number. Use one of these methods to locate the number:

- Use the switch module CLI and enter the **ChassisShow** command. The converged network switch serial number is displayed along with other data.
- Locate the serial number on the label attached to the converged network switch. Refer to [Figure 2](#) on page 5 for location.

## Removing and replacing the converged network switch

Complete the following steps to remove and replace a failed converged network switch.

---

**NOTE**

Before beginning this procedure, ensure that you have a replacement converged network switch or filler panel available because you should not leave the slot on the Blade Server Enclosure open for an extended period of time. The slot must be filled with either a replacement converged network switch or a filler panel to maintain proper airflow.

---

1. Back up the converged network switch configuration to an FTP server by using the switch module's **configUpload** CLI command and following the prompts as well as the **cmsh copy** command to upload the CEE configuration. See [“Backing up the configuration”](#) on page 20 for more details.

This commands upload the converged network switch configurations to the server, making it available for downloading to a replacement converged network switch if necessary. It is recommended that you back up the configuration on a regular basis to ensure that a complete configuration is available for downloading to a replacement converged network switch.

2. Stop all SAN activity requiring the ports used by the converged network switch.

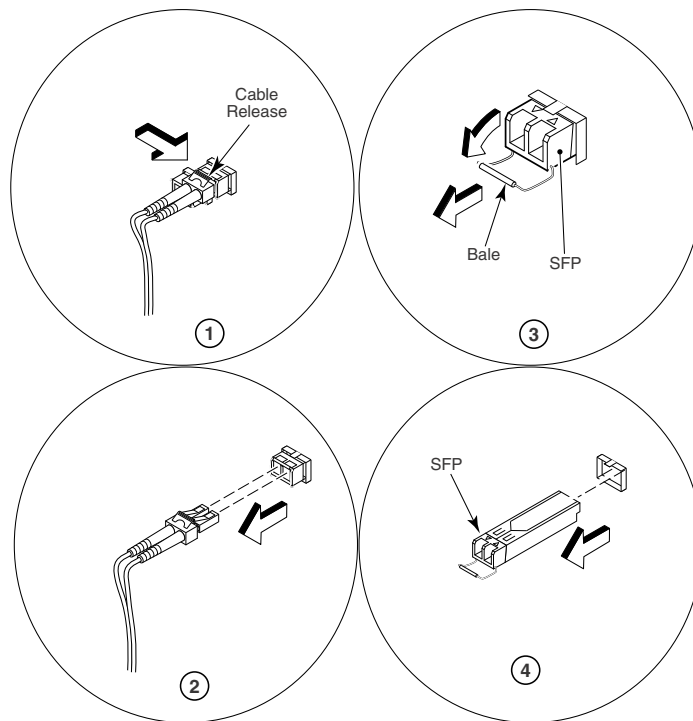
For details about port management, refer to your Blade Server Enclosure Hardware Owner's Manual. Verify that there is no activity by viewing the converged network switch LEDs. For details about LED activity on the converged network switch, see [“Interpreting LED activity”](#) on page 23.

3. Remove all cables from the transceiver modules.
4. Remove the transceiver modules according to the manufacturer's instructions.

[Figure 5](#) on page 26 details the generic process for removing a cable from an transceiver and an transceiver from a port.

### 3 Removing and replacing the converged network switch

**FIGURE 5** Removing a cable and transceiver from a port



5. Refer to the *Hardware Owner's Manual* for the Blade Server Enclosure to remove and replace the switch module from the enclosure.

---

#### **ATTENTION**

If you are not replacing the converged network switch, use a filler panel to fill the empty slot to maintain proper air flow. Do not leave the slot empty.

---

# Dell M8428-k specifications

---

## In this chapter

- [NPIV Mode default port mapping . . . . .](#) 27
- [Processor and memory specifications . . . . .](#) 27
- [Weight and physical dimensions . . . . .](#) 28
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## NPIV Mode default port mapping

The switch module contains 28 total ports. Of these, F\_Ports are ports 1-24 and N\_Ports are ports 0 and 25-27.

In NPIV mode, the switch module F\_Ports are mapped to N\_Ports. The following table lists the factory-default F\_Port to N\_Port mapping for NPIV mode.

**TABLE 4** NPIV mode port mapping

F_Ports	mapped to N_Ports
1-4, 17, 18	25
5-8, 19, 20	26
9-12, 21, 22	27
13-16, 23, 24	0

Ports 17-24 are the eight external CEE ports.

## Processor and memory specifications

The processor and memory installed in the switch module are shown in [Table 5](#).

## A Weight and physical dimensions

**TABLE 5** Memory specifications

Memory type	Value
PowerPC MPC8548 processor	1.33 GHz
SDRAM	1 GB DDR2
Boot flash	4 MB
Compact flash	1 GB

## Weight and physical dimensions

Table 6 lists the weight and physical dimensions of the switch module.

**TABLE 6** Switch module specifications

Dimension	Measurements
Height	32.48 mm (1.27 in)
Width	272.75 mm (10.74 in)
Depth	307.24 mm (12.09 in)
Weight	2.10 kg (4.65 lb) – without media

## Facility requirements

The information in Table 7 shows the operating and non-operating limitations of the Dell M8428-k.

**TABLE 7** Environmental requirements

Condition	Operating	Non-operating
Temperature	0°C to 40°C (32°F to 104°F)	-20°C to 70°C (-4°F to 158°F)
Humidity	10% to 90%, non-condensing at 29°C (84.2°F)	5% to 95%, non-condensing at 38°C (100.4 °F)
Altitude	Up to 3,048 m (10,000 ft)	10,668 m (35,000 ft)
Shock	20 G for 6 ms	50G with velocity change of 4216 mm/sec <sup>2</sup>
Vibration	0.4 G at 5-500 Hz for 60 minutes	0.5 G at 2-200 Hz for 15 minutes
Air flow	30°C (86 °F) Ambient: Approx. 3CFM 40°C (104 °F) Ambient: Approx. 9CFM	None required



## Electrical

[Table 8](#) lists switch module electrical specifications.

**TABLE 8** Electrical specifications and requirements

Dimension	Measurements
DC input	12 V and 3.3 V from chassis
Power consumption	About 60 W normally and 70 W maximum measured

## Architectural specification

The switch module meets the specifications shown in [Table 9](#).

**TABLE 9** Architecture

Feature	Description
Scalability	Refer to the current scalability guidelines publication
Certified maximum	Refer to the current scalability guidelines publication
Performance -FC ports	1.063 Gbps line speed, full duplex 2.125 Gbps line speed, full duplex 4.25 Gbps line speed, full duplex 8.50 Gbps line speed, full duplex
Performance -CEE ports	1 Gbps line speed, or 10 Gbps line speed
Fabric latency (full fabric mode only)	700 nanosecond with no contention, cut-through routing @ 8 Gbps
Maximum frame size	Fibre Channel - 2112-byte payload Ethernet - 9048 -byte frame
Class of service	Class 2 Class 3 Class F (interswitch frames)
Port types	FL_Port F_Port E_Port N_Port
Fabric services (full fabric mode only)	Simple Name Server, Registered State Change Notification (RSCN), Alias Server (multicast),; Zoning, Web Tools, Enhanced Group Management, Fabric Watch (optional), ISL Trunking, Advanced Performance Monitor
Supported software	Telnet, RADIUS, SNMP, Web Tools, Enhanced Group Management, Fabric Watch, Advanced Zoning, ISL Trunking, Advanced Performance Monitoring, Data Center Fabric Manager (DCFM)

## Supported mezzanine cards

The Dell M8428-k currently supports the BR1741M-k 2P mezzanine card.

## Fibre Channel standards compliance

The switch module switch meets or exceeds the Fibre Channel standards for compliance, performance, and feature capabilities as defined in the standards compliance list below.

FC-AL-2 INCITS 332: 1999

FC-GS-5 ANSI INCITS 427: (includes the following.)

FC-GS-4 ANSI INCITS 387: 2004

FC-IFR INCITS 1745-D, revision 1.03 (under development)

FC-SW-4 INCITS 418:2006 (includes the following)

FC-SW-3 INCITS 384: 2004

FC-VI INCITS 357: 2002

FC-TAPE INCITS TR-24: 1999

FC-DA INCITS TR-36: 2004 (includes the following)

FC-FLA INCITS TR-20: 1998

FC-PLDA INCITS TR-19: 1998

FC-MI-2 ANSI/INCITS TR-39-2005

FC-PI INCITS 352: 2002

FC-PI-2 INCITS 404: 2005

FC-PI-4 INCITS 1647-D, revision 7.1 (under development)

FC-FS-2 ANSI/INCITS 424:2006 (includes the following)

FC-FS INCITS 373: 2003

FC-LS INCITS 433: 2007

FC-BB-3 INCITS 414: 2006 (includes the following)

FC-BB-2 INCITS 372: 2003

FC-SB-3 INCITS 374: 2003 (replaces FC-SB ANSI X3.271: 1996; FC-SB-2 INCITS 374: 2001)

RFC 2625 IP and ARP Over FC

RFC 2837 Fabric Element MIB

MIB-FA INCITS TR-32: 2003

FCP-2 INCITS 350: 2003 (replaces FCP ANSI X3.269: 1996)

SNIA Storage Management Initiative Specification (SMI-S) Version 1.2 (includes the following)

SNIA Storage Management Initiative Specification (SMI-S) Version 1.03 ISO standard  
IS24775-2006. Replaces (ANSI INCITS 388: 2004)

SNIA Storage Management Initiative Specification (SMI-S) Version 1.1.0

SNIA Storage Management Initiative Specification (SMI-S) Version 1.2.0

## Regulatory compliance

This section describes the regulatory compliance requirements for the Dell M8428-k.

### FCC warning (US only)

This equipment has been tested and complies with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

### KCC Statement (Republic of Korea)

사용자 안내문 : B 급기기

이 기기는 업무용으로 전자파 적합 등록을 받은 기기  
이오니, 판매자 또는 사용자는 이점을 주의하시기  
바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에  
서 비업무용으로 교환하시기 바랍니다.

### VCCI statement (Japan)

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance might arise. When such trouble occurs, the user might be required to take corrective actions.

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

## BSMI statement (Republic of Taiwan)

BSMI 通告（僅限於台灣）

大多數的 Dell 電腦系統被 BSMI（經濟部標準檢驗局）劃分為乙類數位裝置。但是，使用某些選件會使有些組態的等級變成甲類。若要確定您的電腦系統適用等級，請檢查所有位於電腦底部或背面板、擴充卡安裝托架，以及擴充卡上的 BSMI 註冊標籤。如果其中有一甲類標籤，即表示您的系統為甲類數位裝置。如果只有 BSMI 的檢驗號碼標籤，則表示您的系統為乙類數位裝置。

一旦確定了系統的 BSMI 等級，請閱讀相關的 BSMI 通告。請注意，BSMI 通告規定凡是未經 Dell Inc. 明確批准的擅自變更或修改，將導致您失去此設備的使用權。

此裝置符合 BSMI（經濟部標準檢驗局）的規定，使用時須符合以下兩項條件：

- 此裝置不會產生有害干擾。
- 此裝置必須能接受所接收到的干擾，包括可能導致無法正常作業的干擾。

### 甲類

此設備經測試證明符合 BSMI（經濟部標準檢驗局）之甲類數位裝置的限制規定。這些限制的目的是為了在商業環境中使用此設備時，能提供合理的保護以防止有害的干擾。此設備會產生、使用並散發射頻能量；如果未遵照製造廠商的指導手冊來安裝和使用，可能會干擾無線電通訊。請勿在住宅區使用此設備。

**警告使用者：**  
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，  
在這種情況下，使用者會被要求採取某些適當的對策。

### 乙類

此設備經測試證明符合 BSMI（經濟部標準檢驗局）之乙類數位裝置的限制規定。這些限制的目的是為了在住宅區安裝時，能防止有害的干擾，提供合理的保護。此設備會產生、使用並散發射頻能量；如果未遵照製造廠商的指導手冊來安裝和使用，可能會干擾無線電通訊。但是，這並不保證在個別的安裝中不會產生干擾。您可以透過關閉和開啟此設備來判斷它是否會對廣播和電視收訊造成干擾；如果確實如此，我們建議您嘗試以下列一種或多種方法來排除干擾：

- 重新調整天線的接收方向或重新放置接收天線。
- 增加設備與接收器的距離。
- 將設備連接至不同的插座，使設備與接收器連接在不同的電路上。
- 請向經銷商或有經驗的無線電／電視技術人員查詢，以獲得幫助。

## CE statement

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**ATTENTION**

This is a Class A product. In a domestic environment, this product might cause radio interference, and the user might be required to take corrective measures.

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The standards compliance label on the Switch contains the CE mark which indicates that this system conforms to the provisions of the following European Council directives, laws, and standards:

- Electromagnetic Compatibility (EMC) Directive 89/336/EEC and the Complementary Directives 92/31/EEC and 93/68/EEC
- Low Voltage Directive (LVD) 73/23/EEC and the Complementary Directive 93/68/EEC
- EN50082-2/EN55024:1998 (European Immunity Requirements)
  - EN61000-3-2/JEIDA (European and Japanese Harmonics Spec)
  - EN61000-3-3

## Canadian requirements

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations, ICES-003 Class A.

## Laser compliance

This equipment contains Class 1 laser products and complies with FDA Radiation Performance Standards, 21 CFR Subchapter I and the international laser safety standard IEC 825-2.



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**CAUTION**

Use only optical transceivers that are supported by Dell and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825-2. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

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## Environmental regulation compliance

This section describes the China ROHS environmental regulatory compliance requirements for the switch module.

### China RoHS

The contents included in this section are per the requirements of the People's Republic of China-Management Methods for Controlling Pollution by Electronic Information products.

遵守环境法规

中国 **RoHS**

本节中包含的内容都遵守了中华人民共和国《电子信息产品污染控制管理办法》的要求。

### *Environmental Protection Use Period (EPUP) Disclaimer*

In no event do the EPUP logos shown on the product and FRUs alter or expand that warranty that Dell provides with respect to its products as set forth in the applicable contract between Dell and its customer. Dell hereby disclaims all other warranties and representations with respect to the information contained on this CD including the implied warranties of merchantability, fitness for a particular purposes and non-infringement.

The EPUP assumes that the product will be used under normal conditions in accordance with the operating manual of the product.

环保使用期限 (EPUP) 免责声明:

EPUP 标志不会出现在产品和 FRU 的改装产品中, 也不会对 Brocade 所提供的相关产品保修条款 (该保修条款在 Brocade 及其客户间达成的适用合同中列出) 进行增补。对于此 CD 上包含的相关信息, 如适销性、针对特定用途的适用性和非侵权性的暗示保证, Brocade 在此郑重声明本公司对于与上述信息相关的所有其他保证和陈述概不负责。EPUP 假设在“产品操作手册”中注明的常规条件下使用该产品。

***TS/HS Dual Language Sheet***

In accordance with China's Management Measures on the Control of Pollution caused by Electronic Information products (Decree No. 39 by the Ministry of Information Industry), the following information is provided regarding the names and concentration level of Hazardous substances (HS) which may be contained in this product.

China ROHS Hazardous Substances/Toxic Substances (HS/TS) Concentration Chart

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Fibre Channel Switch	X	0	0	0	0	0
PCBA cards	X	0	0	0	0	0
transceivers (optical cable connectors)	X	0	0	0	0	0
Sheet Metal	X	0	0	0	0	0
Mechanical brackets and Slides	X	0	0	0	0	0
Software/ Documentation CDs	0	0	0	0	0	0


X indicates that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/T11363-2006 Requirements for Concentration Limits.

0 indicates that no such substances are used or that the concentration is within the aforementioned limits.

## A Environmental regulation compliance

### CHINA ROHS有害物质/有毒物质(HS/TS)限量列表

有毒与有害物质或元素的名称及含量  
根据中国的<<电子信息产品污染控制管理办法>>  
(信息产业部第39号令)，本公司提供以下有关产品中可能含有的有害物质(HS)的名称及含量水平的信息。

主要部件名称	有害/有毒物质或元素					
	铅 (PB)	汞 (Hg)	镉 (CD)	六价铬 (CR6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
光纤通道交换机	X	O	O	O	O	O
线路板部件	X	O	O	O	O	O
 SFP (光纤接头)	X	O	O	O	O	O
钣金件	X	O	O	O	O	O
机械支架及滑轨	X	O	O	O	O	O
软件/文档光盘	O	O	O	O	O	O

X 表示此类部件内同质材料中的有害/有毒含量高于SJ/T11363-2006的限量要求。  
O 表示未使用此类物质或其含量低于上述限量要求。

## Regulatory certifications

Table 10 lists the safety and EMC (electromagnetic compatibility) specifications for which the Switch is certified.

**TABLE 10** EMC certifications

Country	Safety specification	EMC specification
Argentina	IEC 60950-1:2001 IEC 60825-1:1993+A1+A2	
Australia and New Zealand		EN55022:2006 Class A
Canada	CSA60950-1-03 1st Ed.	CSA 108.8 Class A
China (power supply only)	GB4943-1995	GB9254-1998 GB17625.1
European Union (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, and United Kingdom)	EN 60950:92 +A1:93+A2:93+A3:95+A4:96+A11:97 73/23/EEC EN60825-1:1994/A11, -2 TUV (Germany only) IEC 60950+A1+A2+A3+A4+A11 (NEMKO CB Report) (Norway only)	EN55022:2006 Class A EN 55024 (Immunity) EN 61000-4-2 Electrostatic Discharge EN 61000-4-3 Radiated Fields EN 61000-4-4 Electrical Fast Transients EN 61000-4-5 Surge Voltage EN 61000-4-6 Conducted Emissions EN 61000-4-8 Magnetic Fields EN 61000-4-11 Voltage Dips and Interruptions EN 61000-3-2 Limits for Harmonic Current Emissions EN 61000-3-3 Flicker
International	IEC 60950+A1+A2+A3+A4+A11	EN55022 Class A
Japan	IEC 60950+A1+A2+A3+A4+A11	EN55022 Class A EN 61000-3-2 Harmonics (JEIDA Limits)



**TABLE 10** EMC certifications (Continued)

Country	Safety specification	EMC specification
Republic of Korea		KN24 KN22
Russia	GOST R IEC 60950-2002	GOST R 51318.22-99 (Class A) GOST R 51318.24-99 GOST R 51317.3.2-99 GOST R 51317.3.3-99
Taiwan (power supply only)		CNS13438
United States	UL 60950-1 1st Ed.	EN55022 Class A FCC Part 15, Subpart B (CFR title 47), Class A

## A Environmental regulation compliance

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